

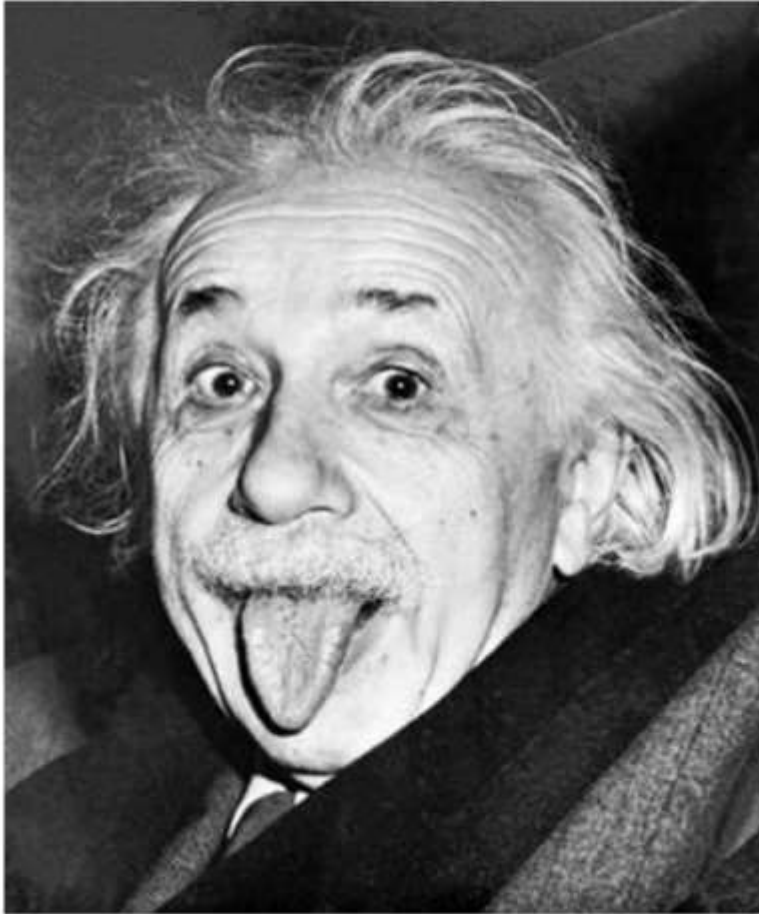


# EEG Signal Pre-processing - Epoching

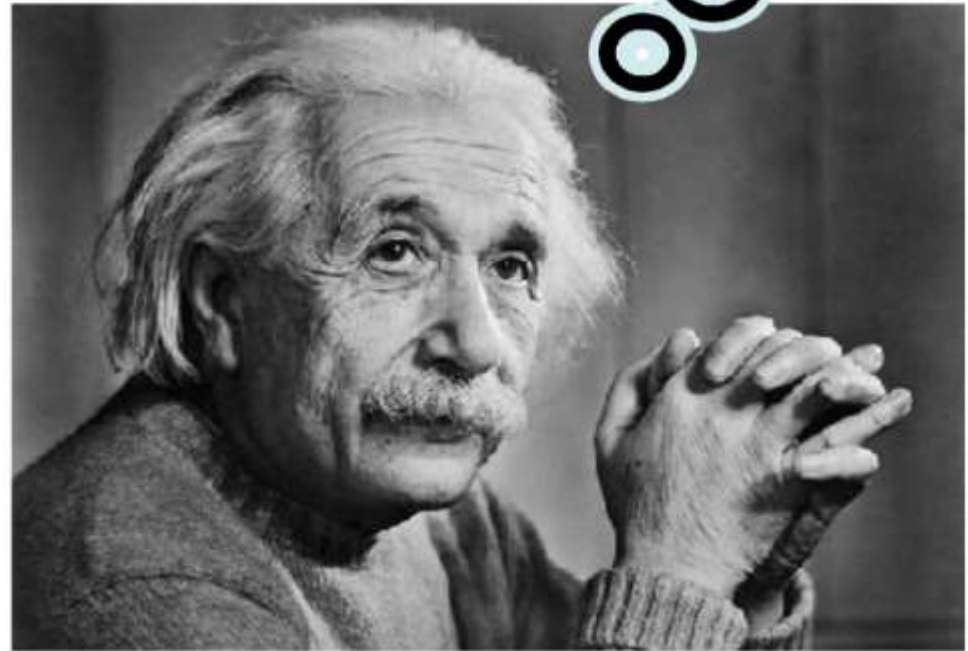
**Course Instructor**

**Dr. Annushree Bablani**

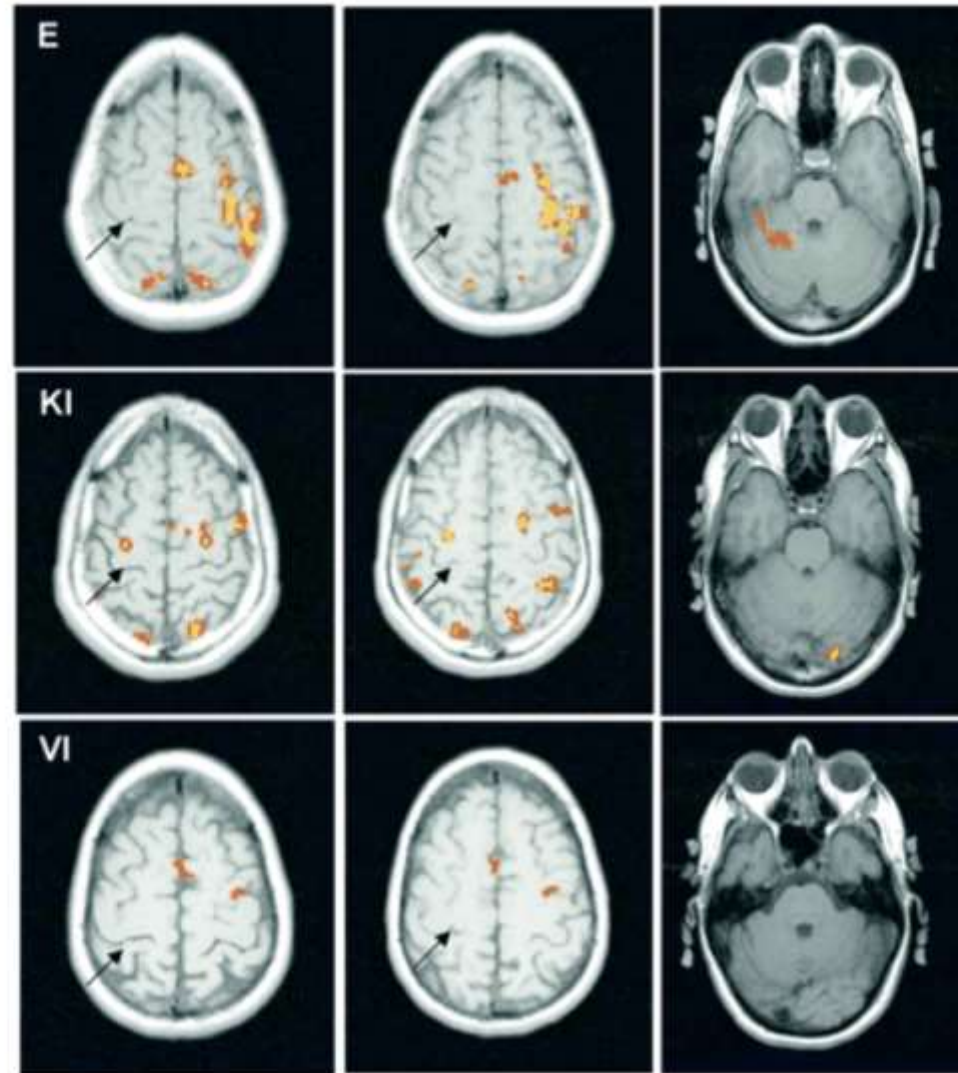
# Motor Imagery



VS

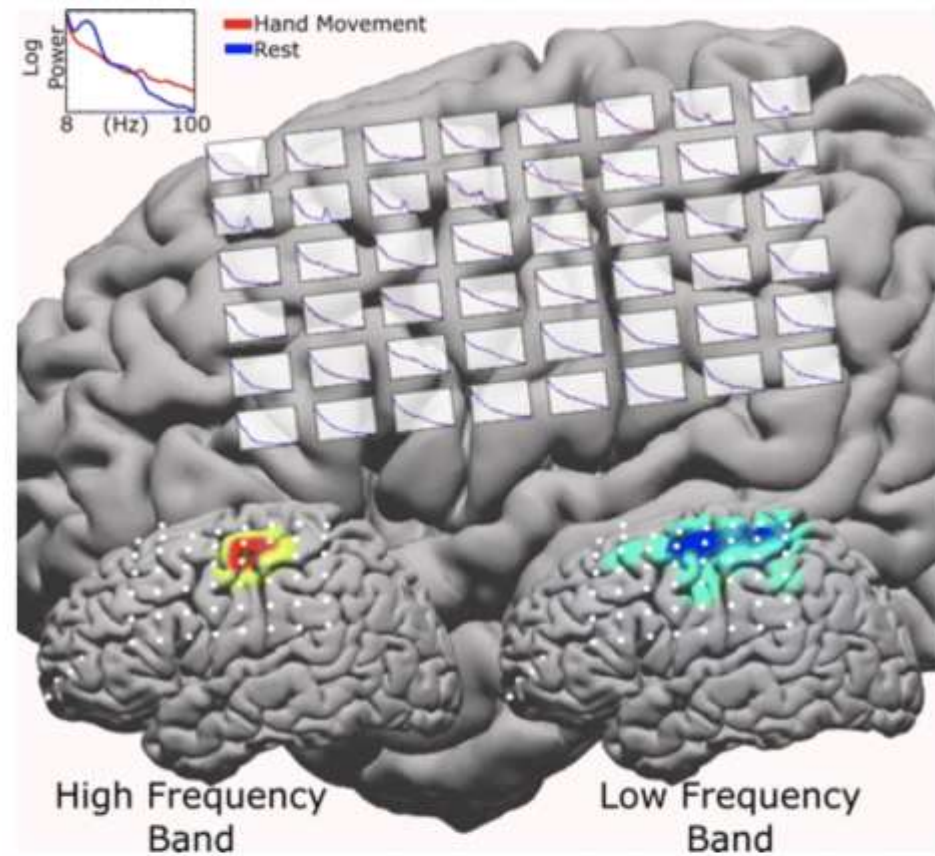
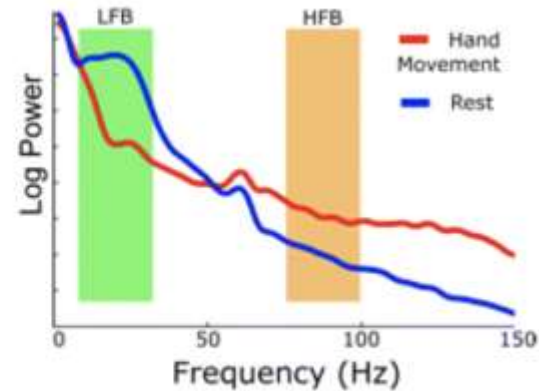
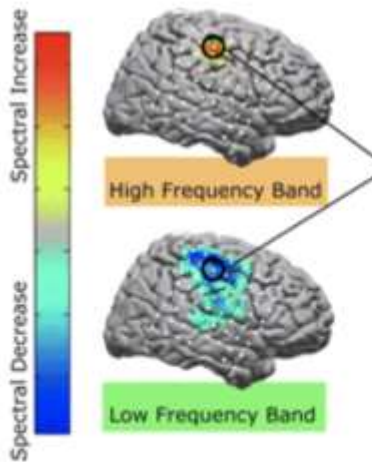
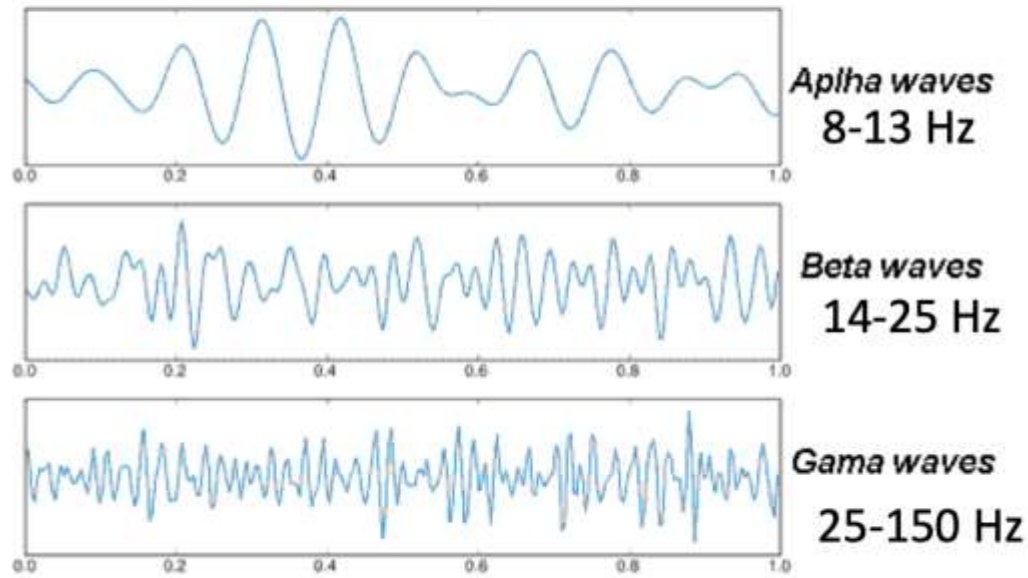


# Brain activity during motor action vs imagery



Solodkin et al, 2004

# Motor rhythms in cortex



Miller et al, 2007

# Goal of the work

To check whether real movements can be compared with imagery movements.

Methods Used:

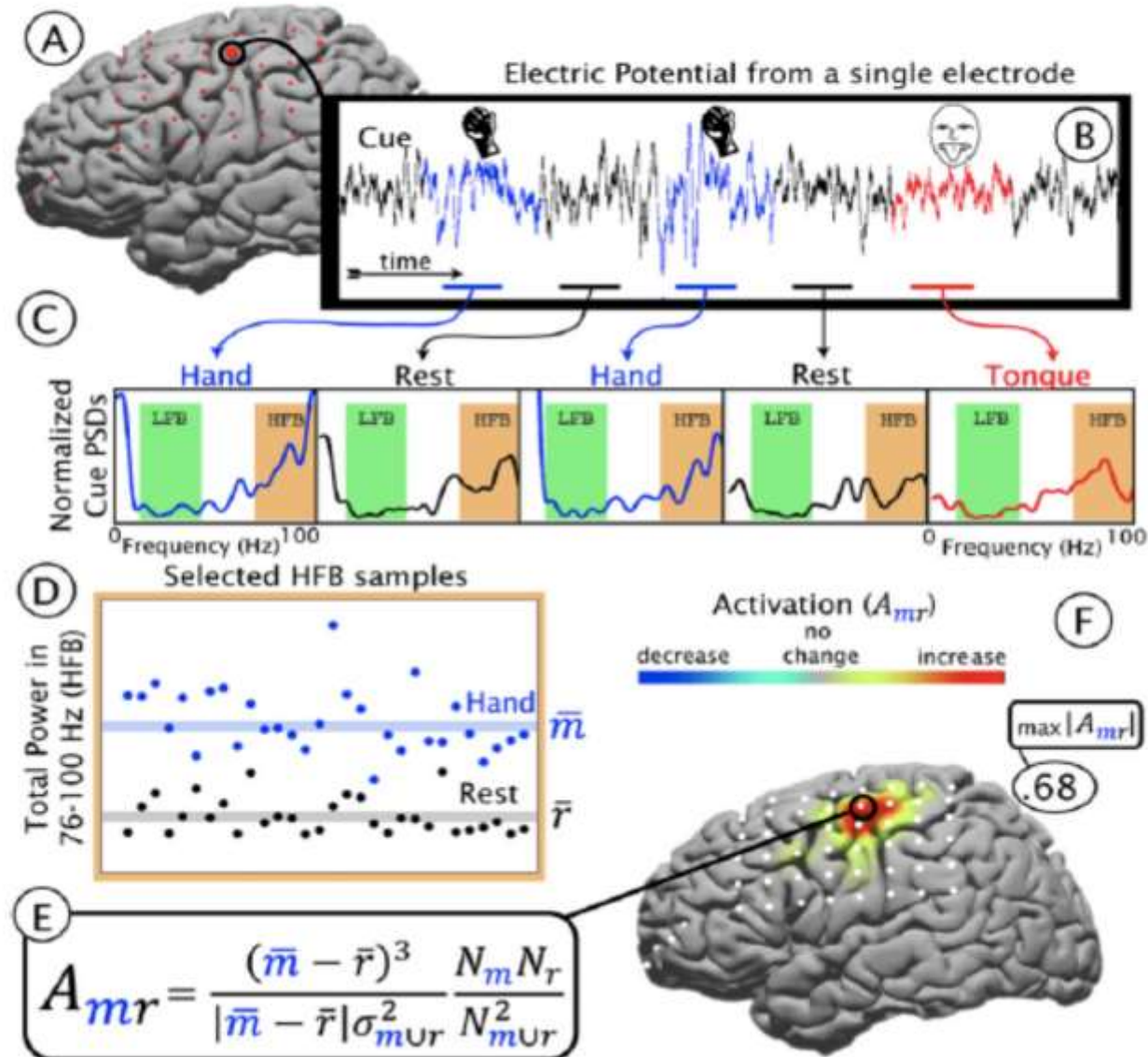
- 8 patients implanted with 4x8 or 8x8 grid

**1) Active movements** –clench – release of hand, stick out tongue, shoulder shrug, say the word “move”

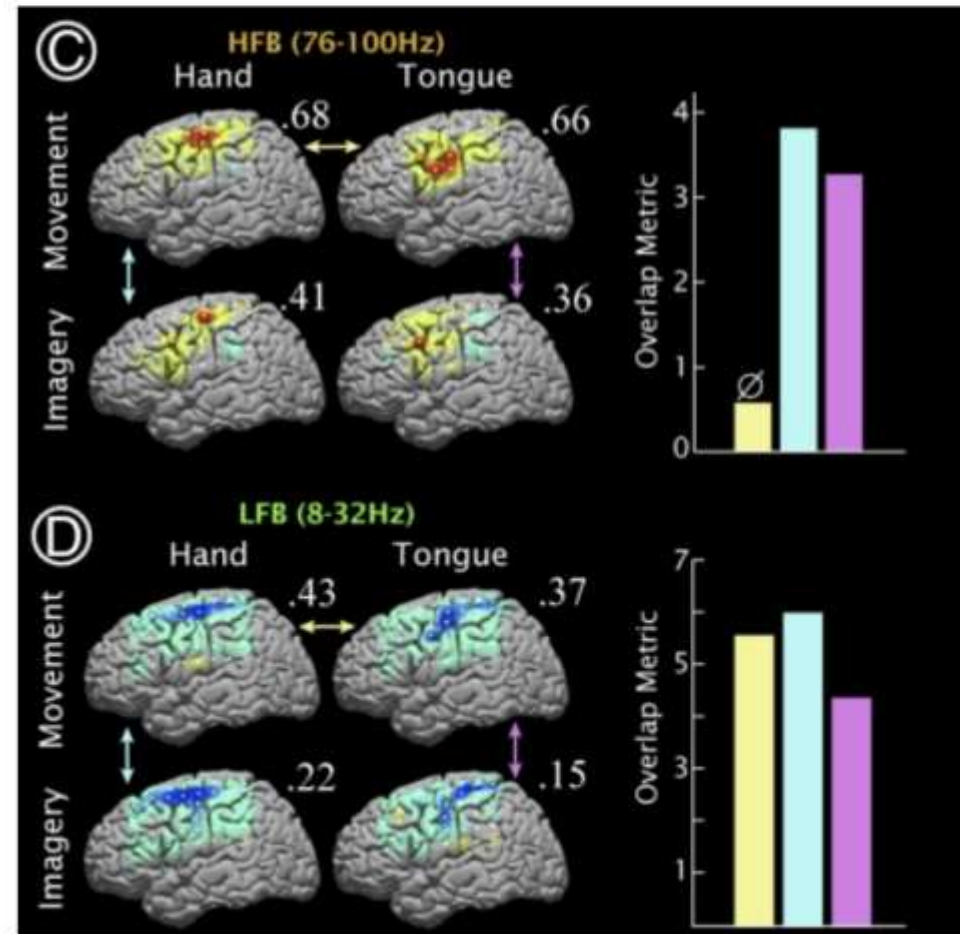
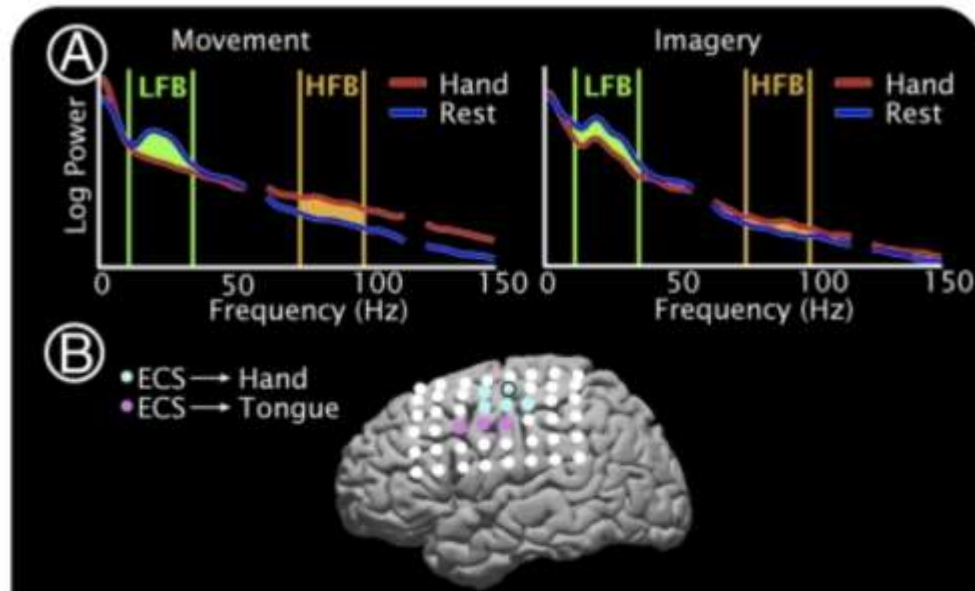
**2) Image movements** – same as before



# Quantification of brain activity



# Cortical activity during real and imagined movements



# Data Epoching

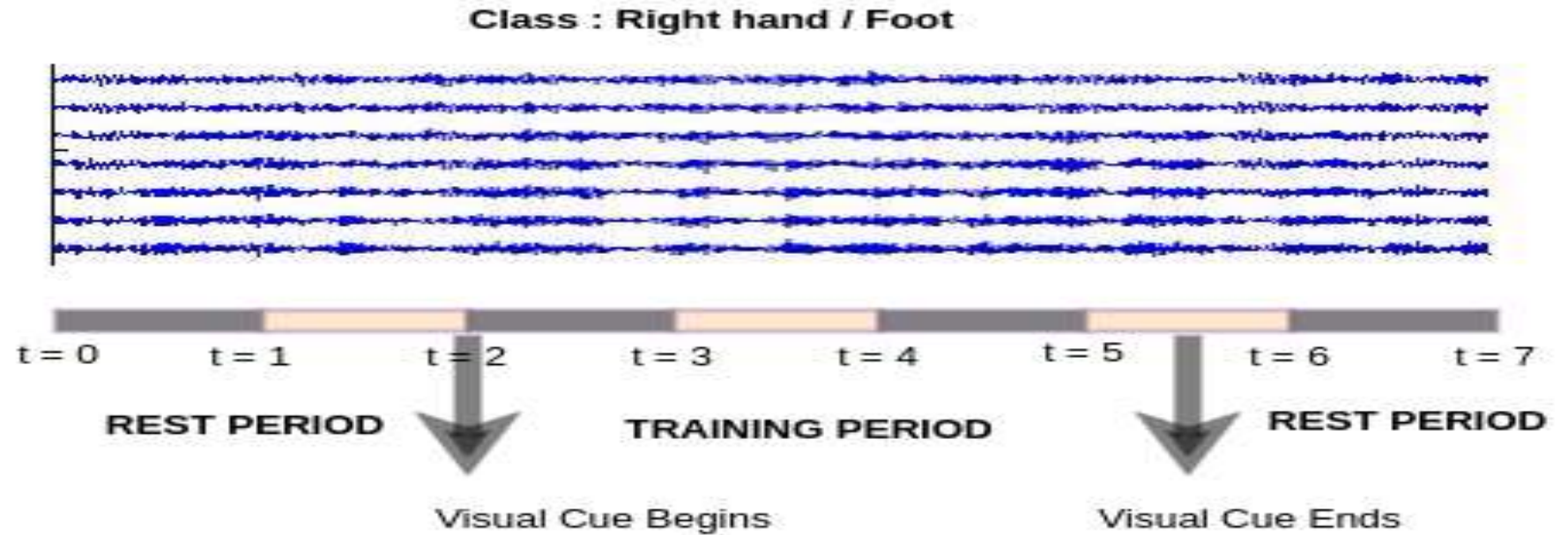
## Selecting data epochs

There is no real good reason to select subsets of data epochs. When comparing conditions – performed by creating contrast at the STUDY level (the group analysis interface which may also be used for single-subject analysis) – one may ignore specific data epochs.

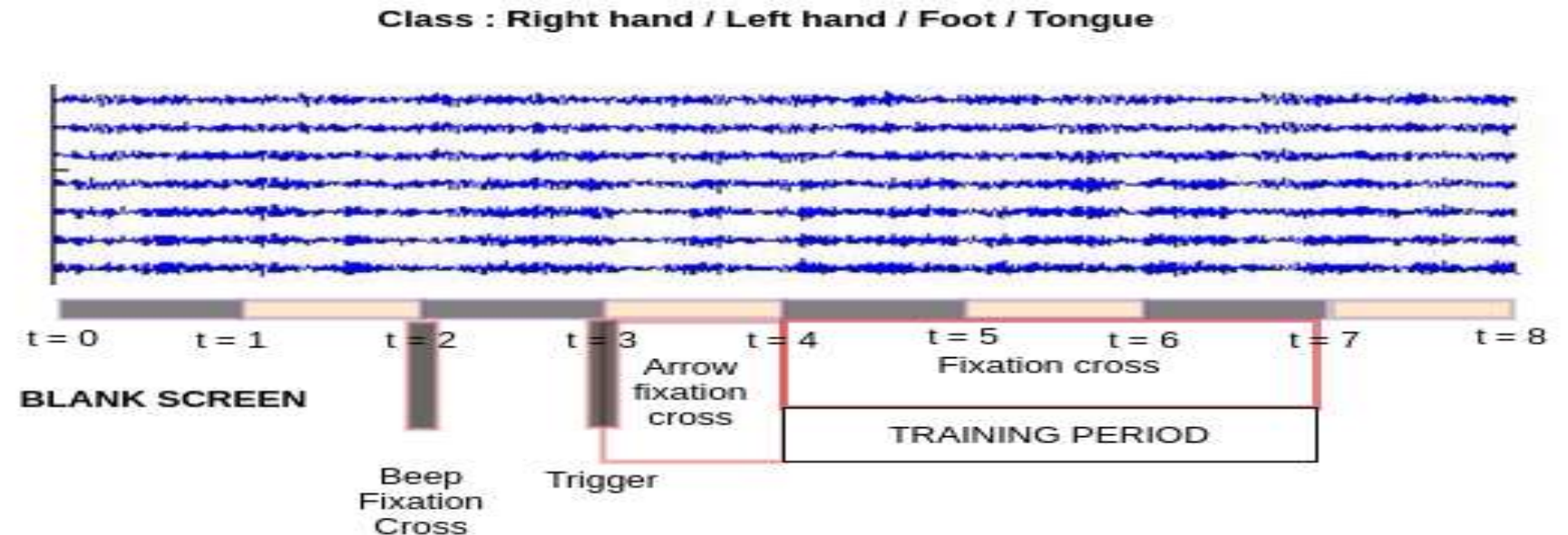
- Non-overlapping segments
- Overlapping segments
  - Fully overlapping segments
  - Partially overlapping segments



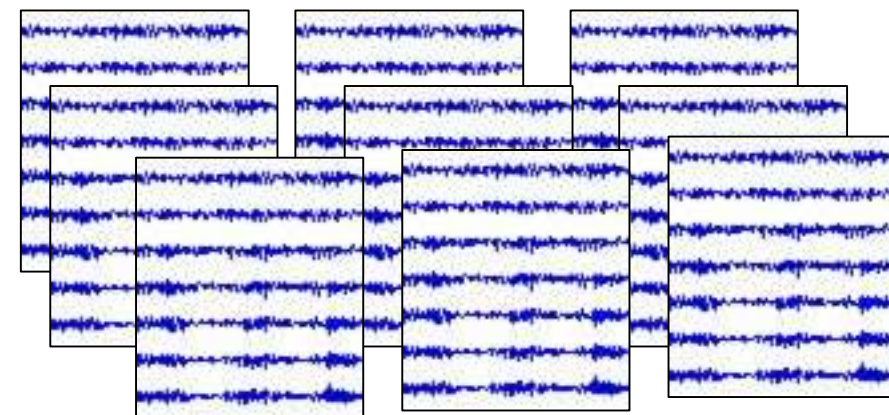
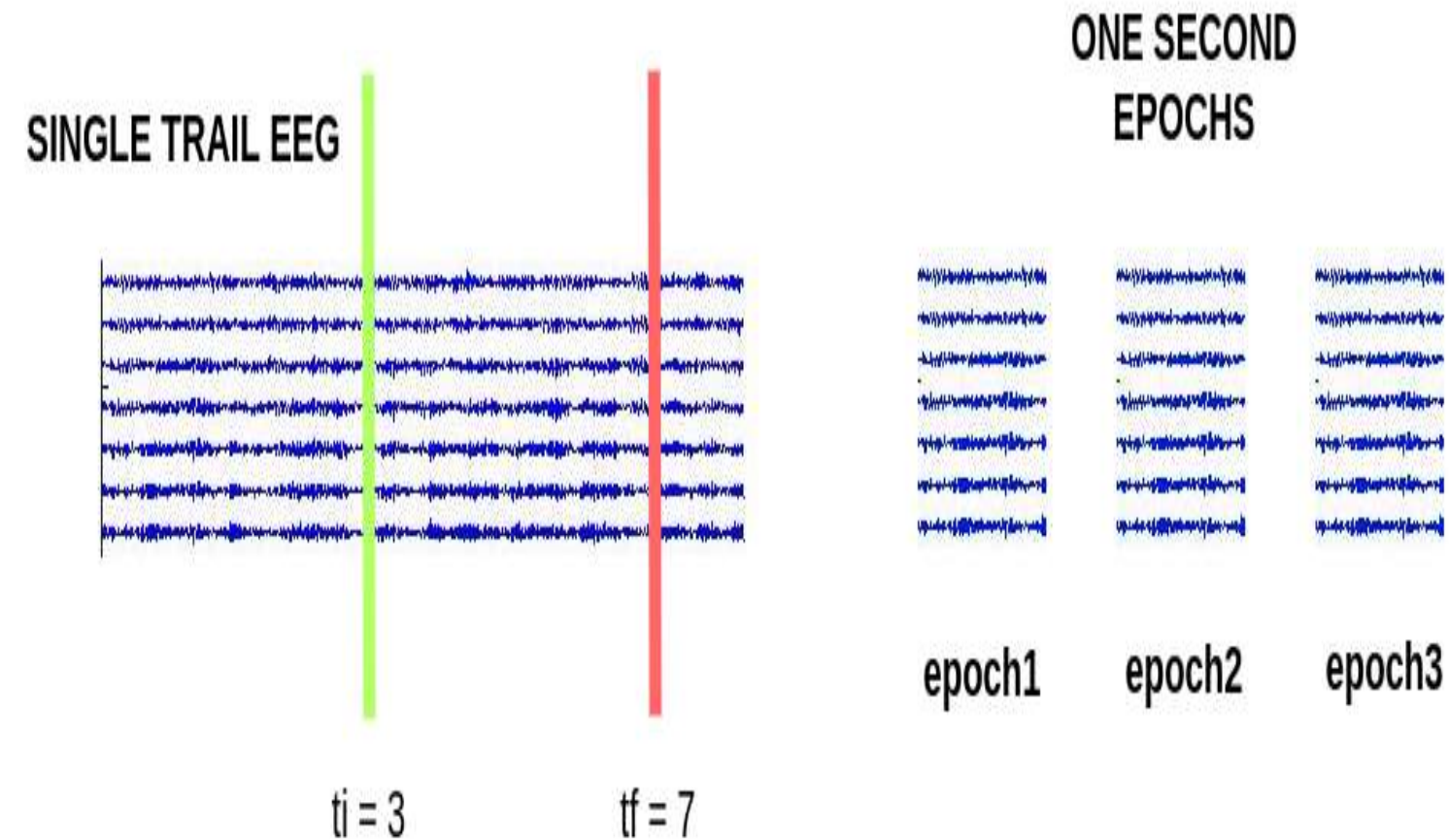
**DATASET  
1  
SINGLE  
TRIAL**



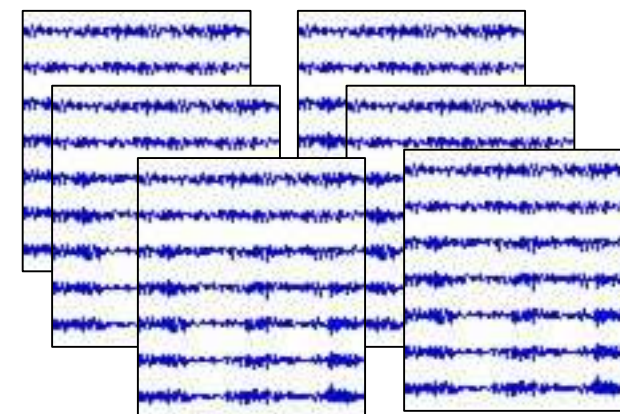
**DATASET  
2  
SINGLE  
TRIAL**



# Data Epoching



**TRAINING SET(80%)**

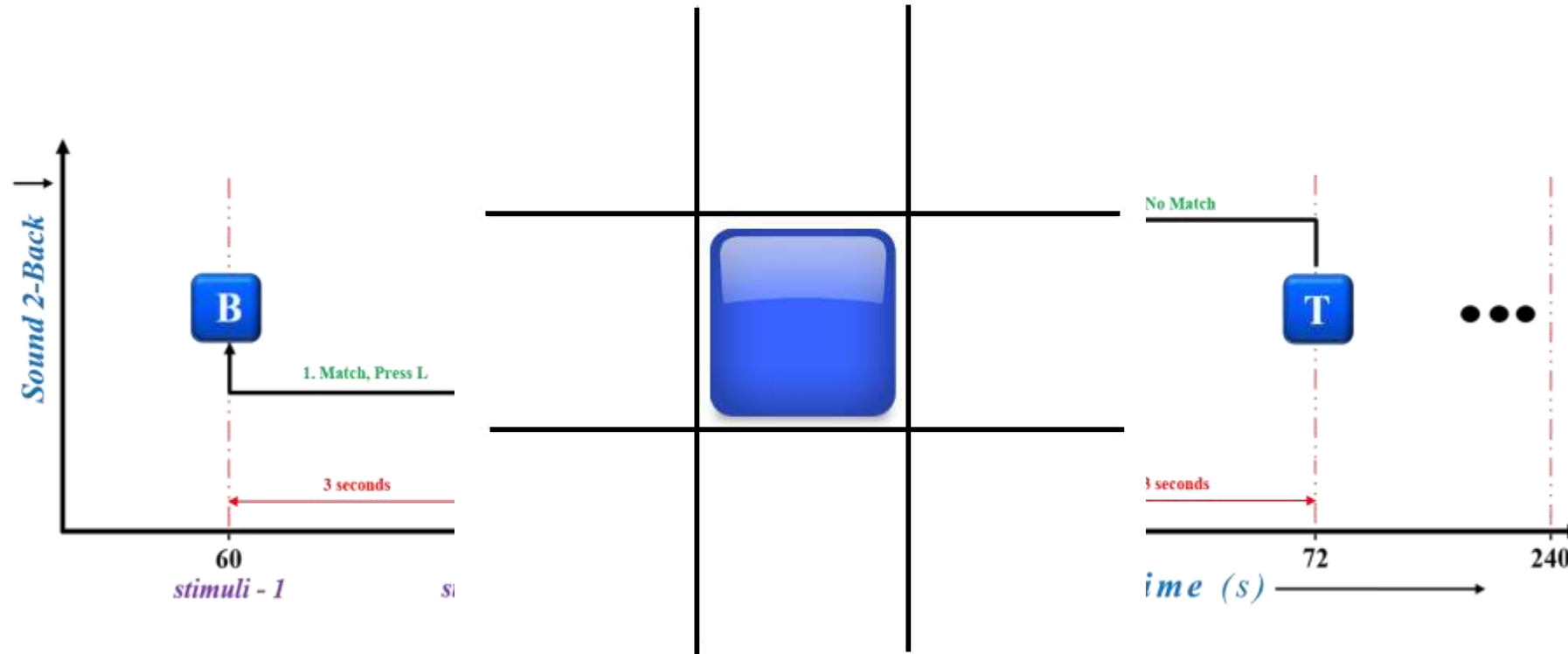


**TEST SET(20%)**

# Cognitive Workload

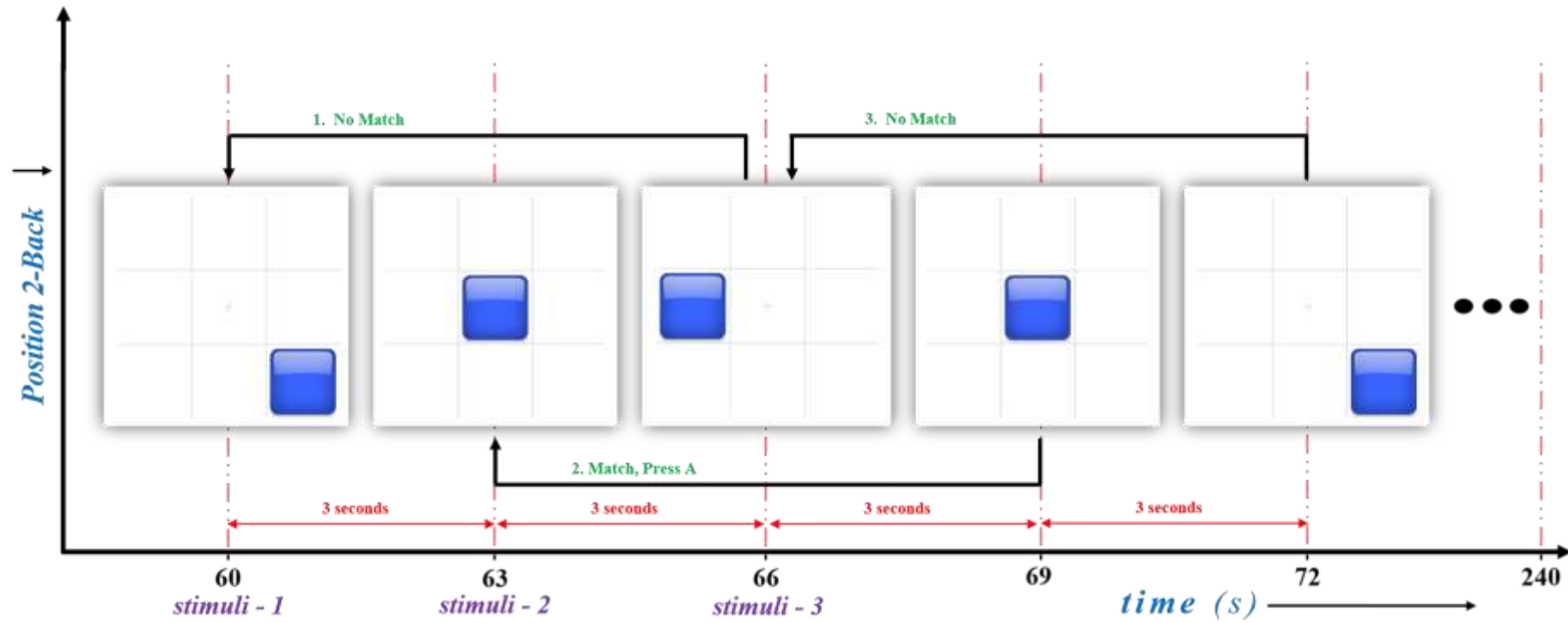
- Cognitive Workload (**CWL**) is a demand placed upon humans for mental resources while performing a task.
- Mental resources include working memory, ability to process, etc.
- **Working memory (WM)** is a cognitive system with a limited capacity to hold a small amount of information and process it.

# $n$ -Back Task



Sound 2-Back

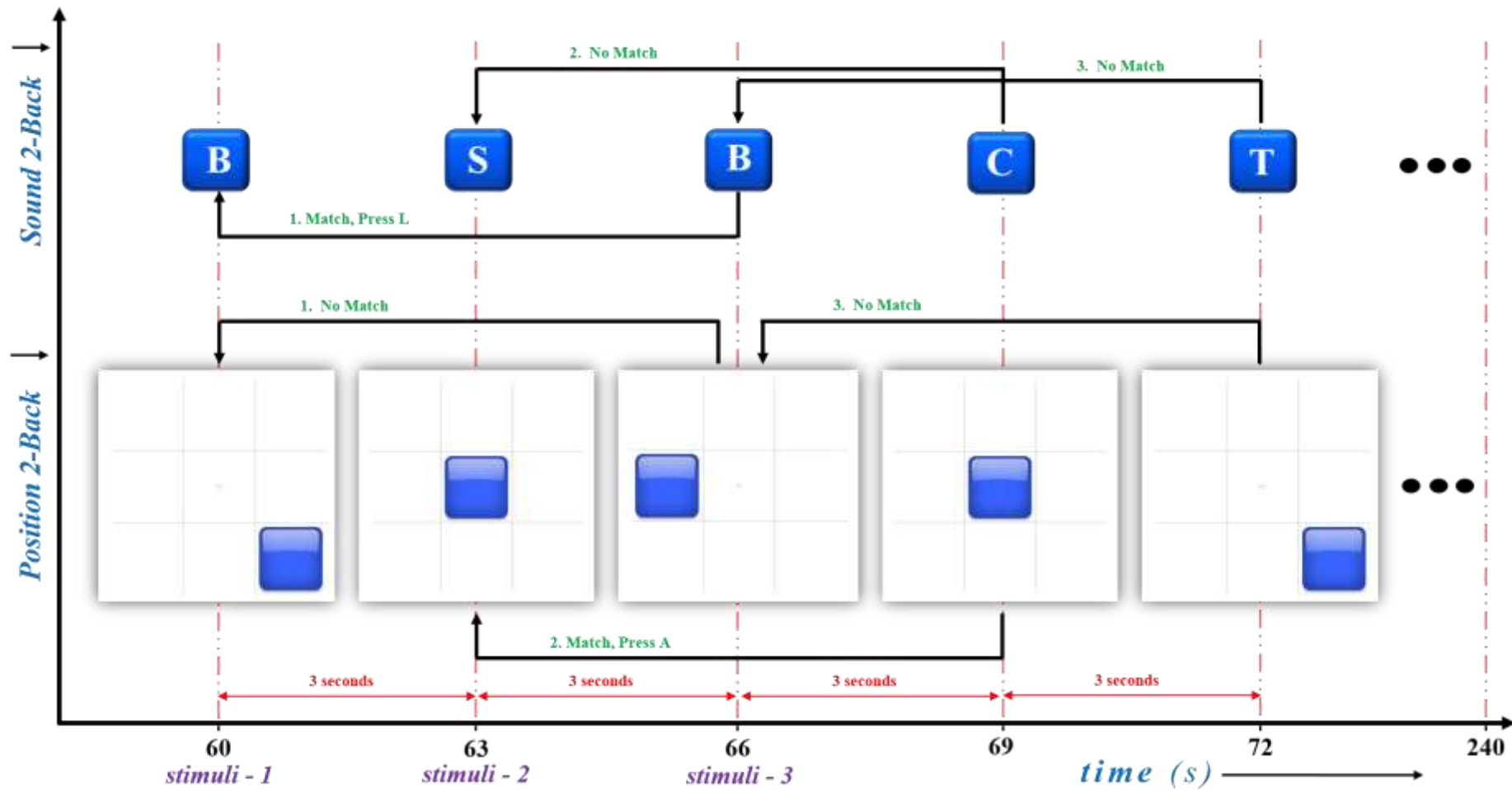
# $n$ -Back Task



**Position 2-Back**



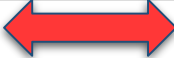
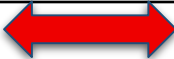



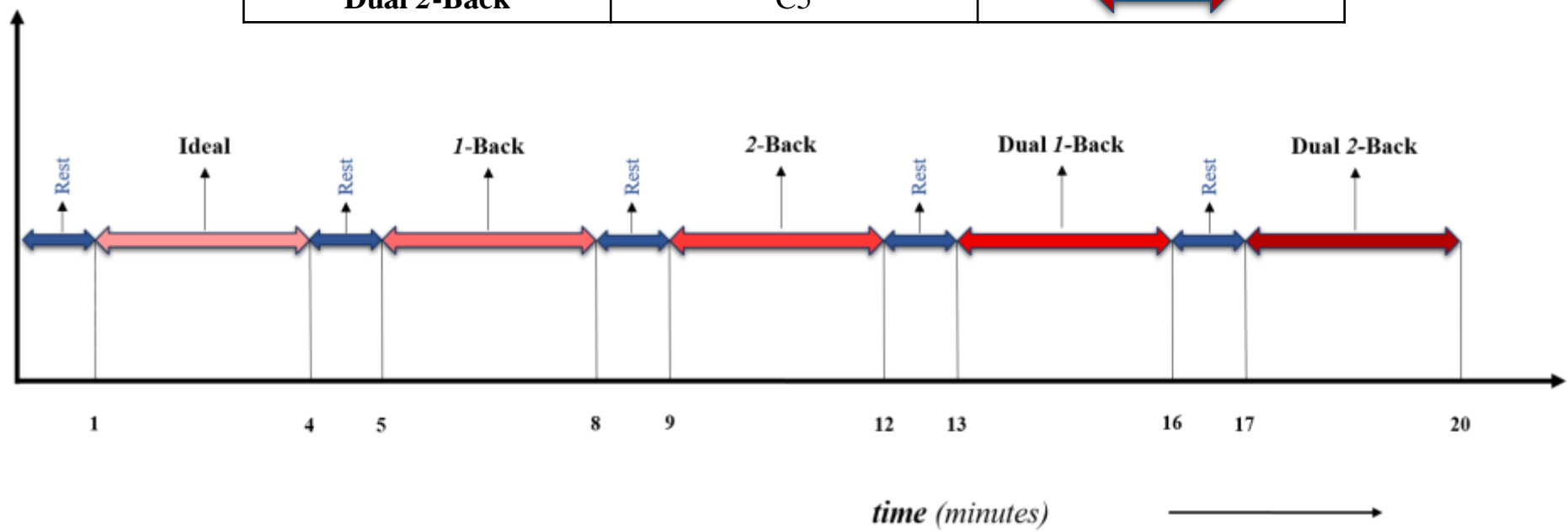
# $n$ -Back Task



Sound & Position 2-Back

# Data Epoching

Task	Cognitive Workload Class	Colour Code depicting Load Variation
Idle	C1	
1-Back	C2	
2-Back	C3	
Dual 1-Back	C4	
Dual 2-Back	C5	



Thank you!!